



# ADVENTURES IN TROPICAL SCIENCE FOR JUNIORS

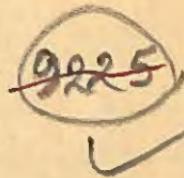
## Book 2



*Adventures in  
Tropical Science  
for Juniors*

*L855*  
*A225 DE*

N. A. WATTS  
B.Sc., B.T., A.B.T.I.



Illustrated by M. Multick



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## FOREWORD

MOST young children come to school eager to learn. They are alive with curiosity, on edge to explore, among other things, the wonderland of Nature, animate and inanimate. Nature Study has rightly been since the beginning of this century an essential part of the curriculum of the Primary School child; but, unfortunately, it has in too many instances meant largely a dictated series of notes to be learnt by rote rather than a real, vital contact with Nature's wonders. And even where a good text-book has replaced the exercise book filled with dictated notes, it has been generally a text-book written for English or American children, which, while excellent in itself, has had little relevance to the Indian child.

To improve and make more relevant to Indian conditions the teaching of Nature Study or Primary School Science in Anglo-Indian Schools in West Bengal, an expert Committee met in 1954 under my Chairmanship to draft a suitable graded syllabus and suggest suitable methods of teaching this important subject in the Primary School. The outcome of its findings was published by Orient Longmans in a pamphlet entitled "Suggestions for the Teaching of Nature Study and General Science in Schools in India".

Mr. Watts, who was an active member of the above Committee, has based his series of admirable text-books on the syllabus and methods outlined in the above pamphlet, and has done an excellent job of work. His series of text-books appears to me to be particularly well-suited to the needs and interests of young children in India, and will, I am sure, prove stimulating both to children and to teachers not only in Anglo-Indian Schools but in other types of progressive schools all over India and in similar regions.

*Adventures in Tropical Science* fills a gap in the text-book field, and I am sure will be warmly welcomed by teachers and children. I wish it every success.

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*Inspector of Anglo-Indian Schools, West Bengal*

# ADVENTURES IN TROPICAL SCIENCE

## FOR JUNIORS

A simple introductory series  
to the study of General Science  
for schools in India

Book 1.	For pupils up to the age of	8
Book 2.	" " " " " " " " "	9
Book 3.	" " " " " " " " "	10
Book 4.	" " " " " " " " "	11

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## PREFACE

THE conception of science taught in the primary school must not be falsified or distorted by an exaggerated importance placed on the accumulation of knowledge to be acquired and crude, inert blocks of data to be stored. The subject must be planned along lines that are vivid and unencumbered by the dead-wood of a formal tradition, quickened by inquiry, initiative and ingenuity; refusing to be distracted by methods which have for their criterion an attachment to conventional orthodoxies, rather than an appraisement of the essential needs and possibilities of the children themselves. New avenues should be explored, by which the pupils leave the beaten path and strike out fearlessly, predominated by curiosity, into new fields: which is the very soul of education. Assimilation and appreciation of science must be a lively, realistic process, cultivating the imagination and fostering social spirit; a stream in motion, not a stagnant pool.

In composing the four books in this series the author does not pretend to have made any startling discoveries or to have enunciated novel truths; rather is this an attempt to create and instil in the minds of children, according to their maturity levels, provocative interest and an understanding of the wonder and variety of the world in which they live. Sedulously applied it may be expected to impart a meaning and motive to the child's initial experience of the miracle of life.

The teacher must formulate a philosophy of teaching adjusted to suit the conditions and needs of the neighbourhood. It should be flexible, adaptable and developing in its nature, subject to modification with the introduction of new evidence. In the ultimate analysis, each method of teaching should appeal to the emotion of the children, relying less on mass-instruction and more on the encouragement of individual and co-operative effort, resulting in the pooling of material and ideas, so that the school may be regarded not as the antithesis of life, but as its complement and commentary.



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# I

## *The Air around Us*

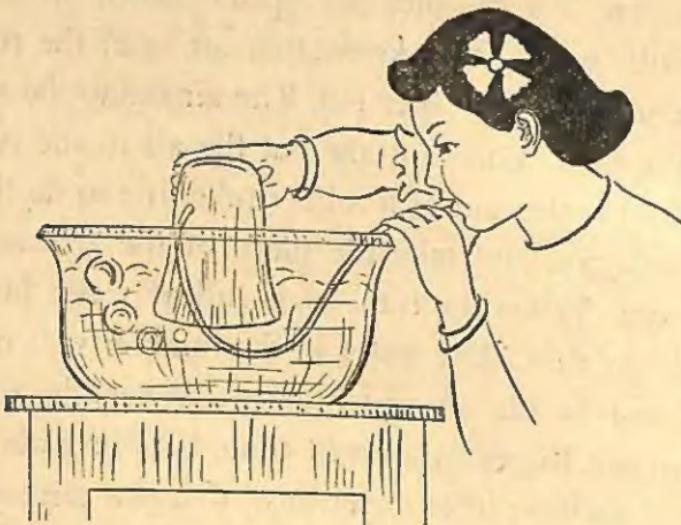
AIR IS everywhere. Sometimes it is so still that you cannot feel it. At other times it blows in great gusts. If you wave your hands about, you can start a small gust of wind. By flapping an exercise book or a hand fan, a larger gust of wind can be started. When an electric fan is switched on a large amount of air is set in motion.

- Place an 'empty' tumbler upside down in a bowl filled with water. You know that air is in the tumbler because it keeps the water out. The air cannot be seen as it is colourless. You can take out the air in the tumbler by sucking at the end of a rubber tube. If you do this the water will rise and take the place of the air you have sucked out. When the tumbler is full of water blow air through the tube. The water in the tumbler will now be pushed out by the air you blow in. When the tumbler is full of air, the extra air will come bubbling out.

Here is another little experiment that you can try quite easily. Light two candles and place them in separate

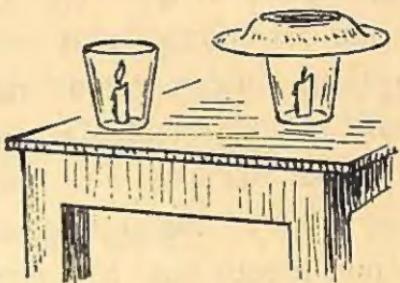


*Taking out air from an empty tumbler*



*Putting air into a tumbler full of water*

tumblers. Now cover one tumbler with a saucer. The flame of the candle will flicker and die. This happens because the air inside the tumbler is not enough for the candle to continue burning. The candle kept in the open tumbler, however, will continue to burn. It does so, because it has all the air it needs. From this experiment we learn something else about air.



*Will a candle burn in a small amount of air?*

Things will only burn if there is air surrounding them. The more air that is supplied to a fire the more brightly will it burn. If you fan a fire you will cause it to blaze. To put a fire out sand is thrown on it. In this way the fire is separated from the air and the flames die.

Look around at your friends. You will see their chests moving in and out. This happens because they are breathing. Air is also needed for our breathing. Many boys like to challenge one another by seeing who can hold his breath the longest. They put their hands over their noses and mouths and prevent air from entering their bodies. In a minute or two they are gasping for air and drawing it in once again. If you play this game, you will

soon realize that air is going in and out of your bodies all the time — day and night. Running about makes us want more air. We take in deeper breaths and we breathe in more often. If anything happens to prevent air from entering our bodies, death will follow.

In some homes people have air-cushions to make themselves comfortable. Do you have one at home? Bring it to school and show it to your class-mates. Once the air is taken out of the cushion it can be easily folded up and put in your bag. It is especially useful when taken on picnics. The air-cushion is yet another example of the usefulness of air to us. Air is used in many other ways. Luckily, there is enough for everyone, for it is all around us.

### *Things to make and do*

#### *Outdoors:*

Divide into small groups and go for a walk around the school compound. Write down all the signs that tell you something about the air around you. Make special notes on (a) what air is helping to do, (b) what moving air is doing.

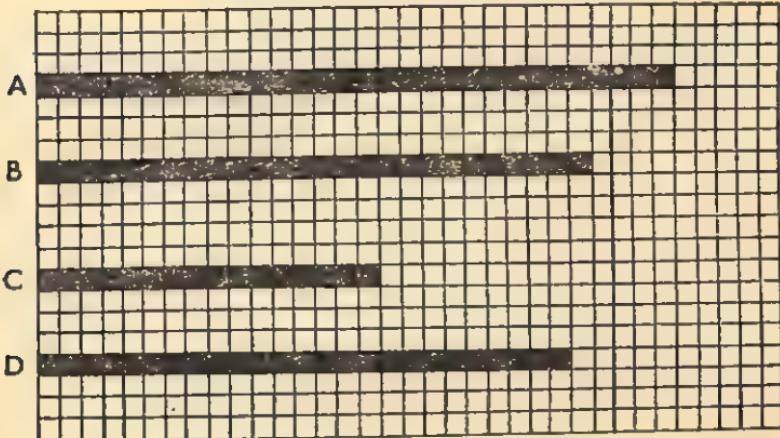
#### *In your note-book:*

After your walk, write out neatly the notes you have made.

*For your wall newspaper:*

Count the number of breaths taken in a minute (*a*) by you, (*b*) by you after a run, (*c*) by a man or woman, (*d*) by a dog or cat when asleep, (*e*) by a dog or cat

Number of Breaths in a Minute

*Different rates of breathing:*

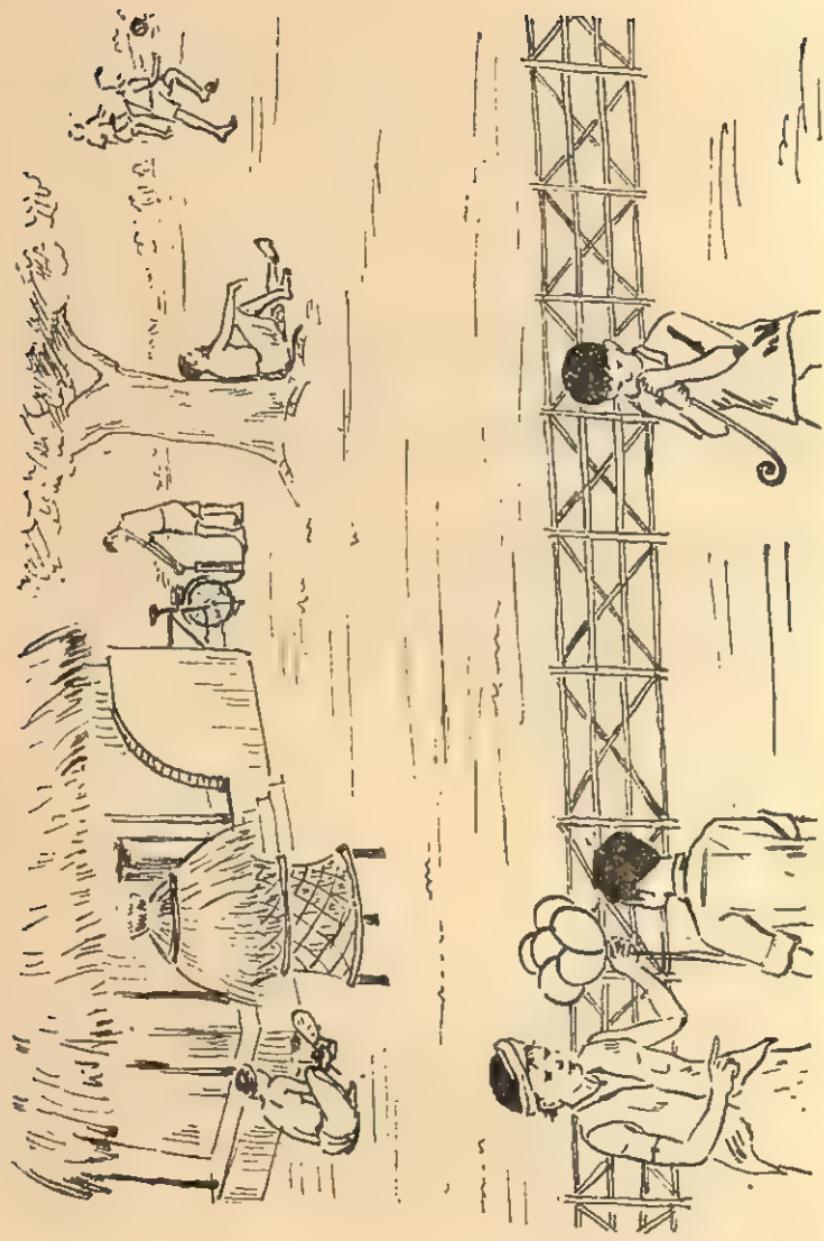
A. Baby (30). B. Child (26). C. Adult (16).  
D. Old person (25)

when awake. On a sheet of squared paper, shade in a square for every breath taken in a minute.

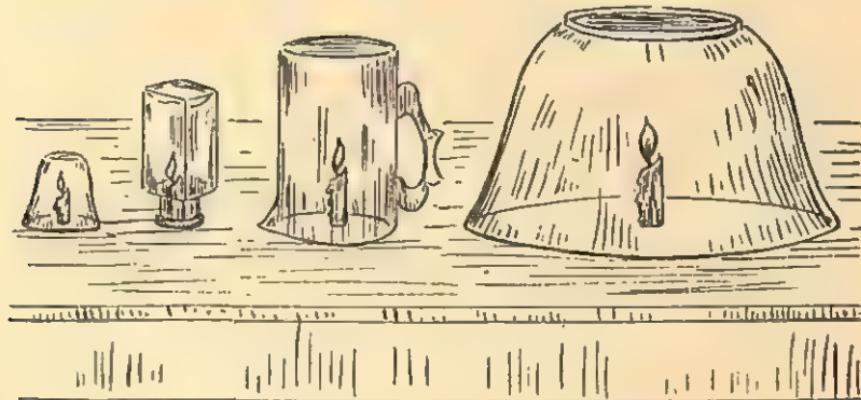
*Do these experiments at home:*

1. Is there any air inside the earth? Try this experiment. Take some earth and fill half a tumbler with it. Now fill up the rest of the tumbler with water. What do you see happening?
2. Light a candle which has been placed on the table.

*How many examples of the usefulness of air are shown in this picture?*



Begin to cover it with a tumbler. As you do so the flame flickers, and almost goes out. Raise the tumbler and you will notice the flame burning brightly. Try to think of a reason why this should happen.



*Which candle will burn the longest?*

3. Light four candles. Cover them (at the same moment) with a small tumbler, a jam-jar, a jug and a large bowl. Which candle will go out first? Can you say why?
4. Tear two sheets of paper from an old exercise book. Roll one of them into a tight ball. Now set fire to both sheets. Explain any difference you see in the rates of burning of the two sheets.

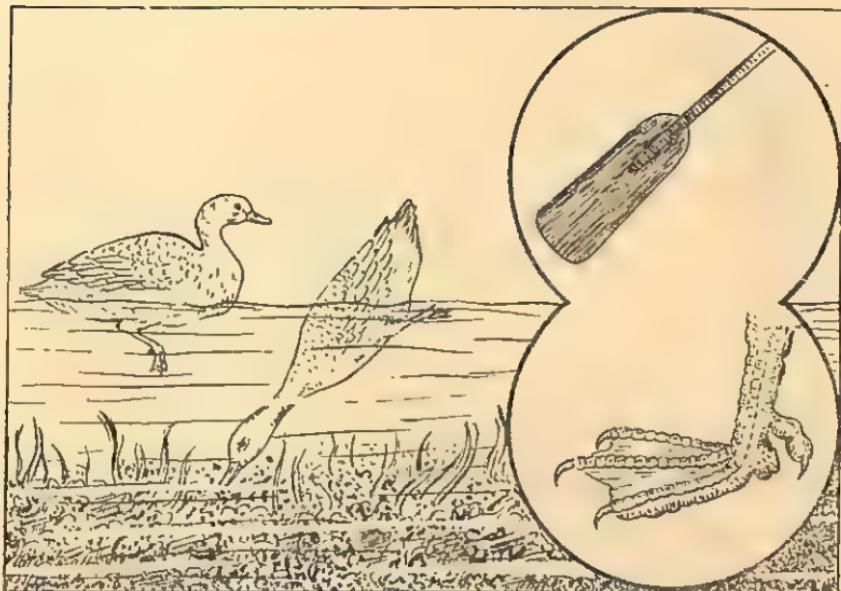
## 2

# *Our Feathered Friends*

IT MUST be wonderful to be a duck and paddle all day in the water! Ducks seem to have such a fine time! They say 'quack, quack' and swim to the centre of the tank where no one can disturb them.

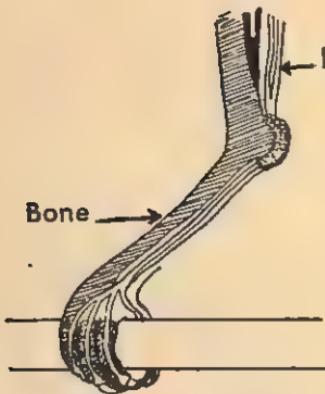
Look closely at a duck's foot. You will see a piece of skin joining the toes together. For this reason ducks are called web-footed birds. Their flat feet make them slow and clumsy on the land as they waddle along. What a difference there is when they dive into the tank. With their flat feet they push back the water and glide along so easily. Suddenly their heads disappear and only their tails are seen above the water. When their heads disappear they are looking for worms at the bottom of the tank. While doing this they use their broad, flat beaks like spoons to dig up the mud. The edges of their beaks allow the mud and water to pass through. If, however, there is a worm in the mud it is swallowed at once. In the same way small plants growing in the water are

eaten. People who keep ducks do not feed them on worms and water-plants. Can you say what other food is given to these birds?



*How ducks use their feet and beaks  
Inset: A duck's foot compared with a paddle*

Fowls never seem to have enough to eat. Most of the day they scratch in the ground and grass with their strong toes looking for seeds and grain. They use their small pointed beaks as well to help them in their search. Not all their time is spent on the ground. Sometimes they fly up on to the top of a fence and perch there. With three



*The inside of a fowl's leg*

the toes tighten their hold on the perch. In getting off, the bird loosens this muscle and the toes open.

Among our feathered friends the parrot is a great favourite. In many homes it is allowed complete freedom. This bird is very fond of climbing. It has two toes in front and two behind. Its bright red beak also helps it to climb. If you frighten a parrot by poking your finger near its face, it may nip you.

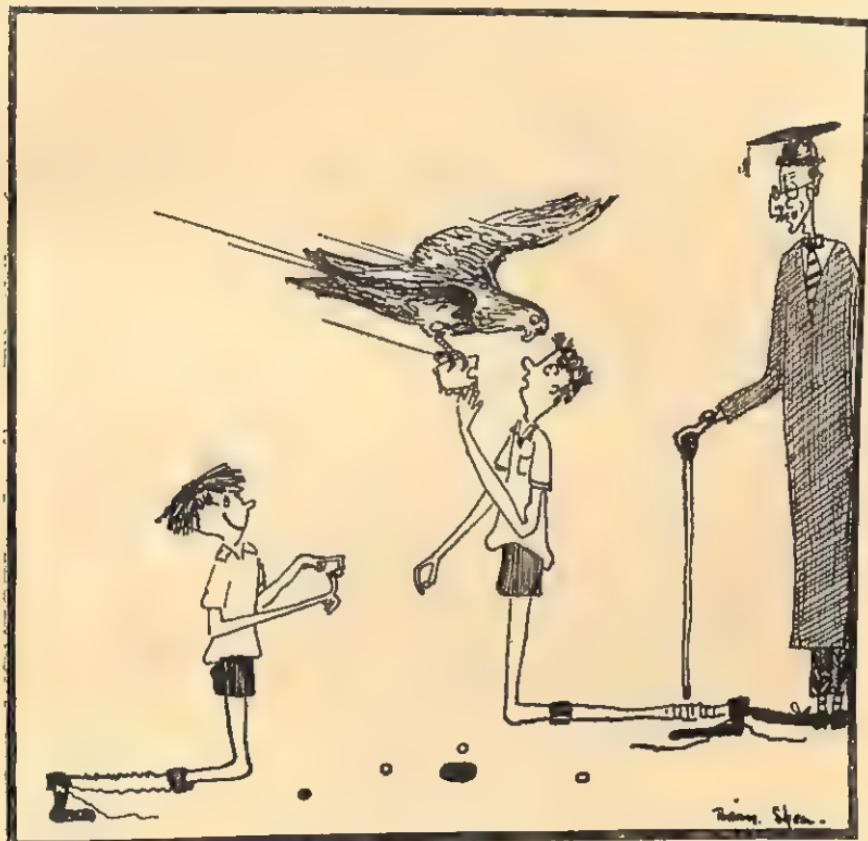
Watch a parrot cracking a

toes in the front and one at the back they seize the rail and may even sleep for a while in this position. Study the picture on this page to see how this is done. Behind the bone is a muscle that is just like a string. When the bird settles on its perch this muscle is pulled upwards and



*A parrot feeding*

nut. Its fleshy tongue rolls the nut into position and its sharp, hard beak does the rest.



*Has this ever happened to you?*

Have you ever had your lunch snatched out of your hand by a hawk that swoops down from the sky? Its powerful feet with their sharp, hooked claws help the bird to do this. This bird eats meat and tears its food by

means of its strong, hooked beak. You may not think of the hawk as a feathered friend if it has snatched your food away from you. Nevertheless, the bird is very useful to us. It feeds on the dead bodies of animals, which, if allowed to remain on our earth, would make it a very unhealthy place. The hawk is yet another example of the wonderful way beaks and feet help birds in their way of life.

### *Things to make and do*

#### *Visit the museum:*

Look for the bird room at the museum. Try to guess the habits and food of the birds you see by looking carefully at their feet and beaks.

#### *In your note-book:*

Strike out the names that are out of place:

Seed-eaters: sparrow, eagle, canary, dove.

Flesh-eaters: hawk, owl, crow, turkey.

Swimmers: bulbul, duck, goose, swan.

Climbers: parrot, swallow, woodpecker, cockatoo.

Perchers: pigeon, ostrich, myna, kingfisher.

#### *For your wall newspaper:*

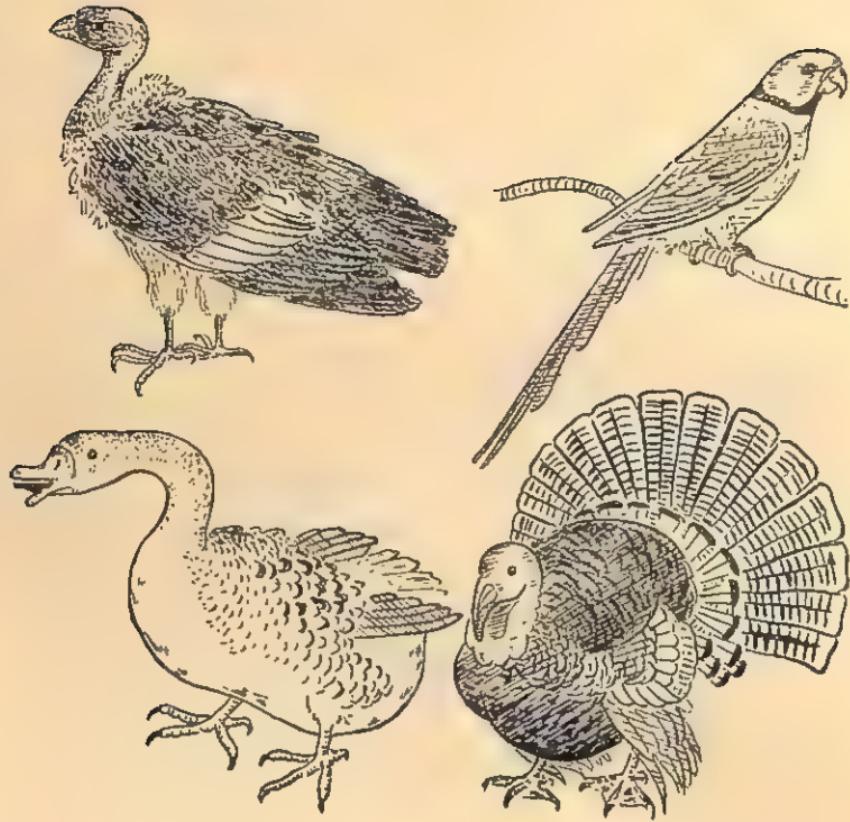
Collect and paste on your board feathers of birds that are found near the school. Beneath each picture write the name of the bird, and the food you have seen it eating.

## 3

*Homes for  
Baby Birds*

EVERYBODY knows where the egg on the breakfast table comes from. It is laid in the fowl-house. The father bird is called the cock and the mother bird is called the hen. If the hen is allowed to sit for a few weeks on her eggs, to warm them, fluffy chicks come into the world. They can run about and look for their own food. There is great excitement when mother hen has found a piece of food. Her call is answered at once. The titbit is broken into little pieces by mother for the small beaks of her young. The little chicks soon learn their mother's warning call and run for cover when they are in danger. If they stray away from their mother a hungry cat or hawk might carry them away.

When some baby birds are hatched they are naked, blind and helpless. Luckily for them, they find themselves in a wonderful little nest. Their cosy home probably has a lining of soft feathers to protect their tender skins. The mother bird has taken good care to build the nest high up



*A picture-puzzle*  
*Vulture*      *Parrot*  
*Goose*      *Turkey*

*A picture-puzzle:*

In this picture the artist has made a number of mistakes. He has given the wrong sort of beaks or feet to the birds shown here. Can you correct him?

in the branches of a tree. Here they are hidden among the leaves and are safe from their enemies who are out to eat them. All day long the parents search for food to feed their young ones and at night mother sleeps in the nest, covering her babies with her warm wings.



*Baby birds with their mother*

At the begin-  
ning of the sum-  
mer the crow

may be seen carrying a twig in its beak. The sign tells us that it is the nesting season of this bird. A crow's nest is not very hard to find. Have you ever taken a close look at the nest of this bird? You will be surprised to see the different things of which it is made.

The place where crows make their nests is called a Rookery. Here many nests will be found in the same tree or on nearby trees.

The Koel is a black bird with red eyes. It is often heard calling 'kuoo, kuoo' during the summer months

and little boys are fond of copying its call. This bird plays a trick on the crow. Father koel teases mother crow

when she is sitting on her eggs. The result of this teasing is a chase through the trees. The moment Mrs. Crow leaves her nest, mother koel quickly arrives to take her place. She destroys a few of the eggs in the nest and lays her own. When mother crow returns she does not notice what has



*A Rookery*

happened, for the koel's eggs are very like her own. She continues to hatch eggs in her nest. When the baby koels arrive they soon succeed in pushing out the baby crows from the nest. Mother crow feeds them believing them to be her own. In this way the koel deceives the crow and avoids the trouble of making its own nest.

The Tailor Bird is more often heard than seen. Its call

'towit-towit-towit' is one of the familiar bird voices in the garden. This bird gets its name from its skill in using cobweb or fibre to stitch together a pair of leaves with its



*A chase through the trees*

beak. The completed nest makes a fine cradle for its young. You will see the Tailor Bird making its nest in the picture on page nineteen.

Among the birds kept at the zoo, the Hornbill attracts our attention. It is about the same size as a hawk, and has a very large beak. This bird is found in our jungles. When

mother hornbill wants to lay her eggs she looks for a hollow in an old tree-trunk. With the help of mud which is made into a paste, Mrs. Hornbill seals herself in the hollow and only allows her beak to peep through. The father bird now spends the whole day searching for food.



*Mr. and Mrs. Hornbill  
Can you find Mrs. Hornbill?*

As a result of this he becomes very thin. Mrs. Hornbill, however, gets as fat as ever. Soon there are baby birds in the nest begging their father for food as well. After two weeks the mother lets herself out and helps to feed her babies, until they are old enough to find their own food.

Birds are among the most beautiful creatures on our earth. Nearly everyone enjoys watching them and listening to their songs. Try and learn their calls, see what food they eat and discover their nesting secrets.



*A Tailor Bird at work*

### *Things to make and do*

#### *During your ramble:*

1. In the school compound you will find the nests of many birds. A rookery should not be too hard to find.

Watch the parent birds for some time. Try and explain what they are doing.

2. Pull apart an old nest to see how it is made. Can you put it together again?

*For your wall newspaper:*

With the help of gummed paper, stick on your board the different things you have seen birds using to build their nests. Under each mounting, write the names of the birds that use what you have pasted.

*In your note-book:*

Do you know these nesting secrets? Fit the correct parts together.

1. Crows	(a) lay blue eggs.
2. Bulbuls	(b) stitch leaves together to make their nest.
3. Tailor Birds	(c) build no nest at all.
4. Mynas	(d) use wire to hold their nest together.
5. Woodpeckers	(e) build nests that are cup-shaped.
6. Koels	(f) nest in tunnels dug in the bank of a stream or tank.
7. Pigeons	(g) build bottle-shaped nests.
8. Kingfishers	(h) lay only one large egg.

9225-

9. Weaver-birds      (i) always lay two eggs at a time.  
 10. Vultures            (j) nest in holes in trees.

*Make this lucky-dip for the birds:*

Hang up a box in a quiet corner of your garden. Fill



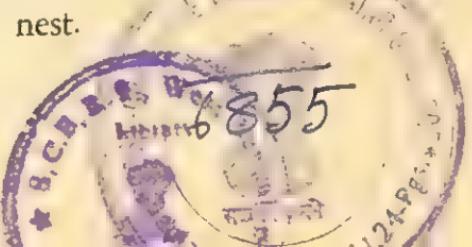
*A lucky-dip for the birds*

it with twigs, horse-hair, feathers, straw, rags, fluff and other things that birds find useful in building their nests. Hide behind a bush and wait until the birds find it. It is a joy to watch them searching among the rubbish for something for their nest.

G.O.R.T. West Bengal

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## 4

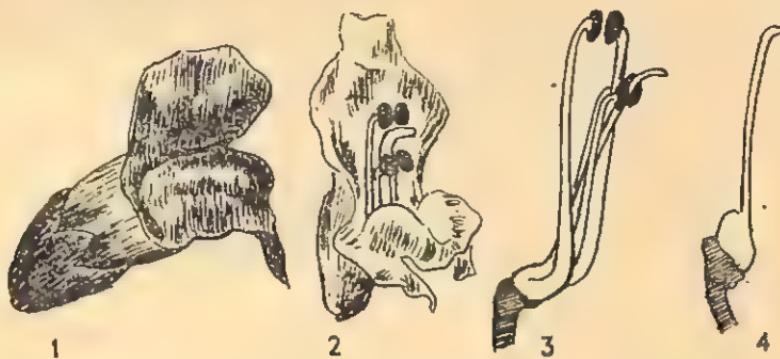
*Contents of  
a Flower Bud*

WHEN someone who is dear to us is expected we welcome him with flowers. In our country, sweet-smelling flowers are made into a garland and this is put around the neck of a visitor. Perhaps you have brought flowers for your teacher to put into the class-room vase. In the class-room flowers do make a big difference.

In the last chapter you were told a few secrets of the birds. Plants have secrets as well.

Look at the Snapdragon. Before a flower opens, its delicate petals and tiny inner parts are guarded by the thick sepals. The part played by these little green leaves, called sepals, is clearly seen when the flower is a bud. Slowly and steadily the sepals open and the brightly-coloured petals unfold themselves. The colour of the petals are different towards the bottom of the flower. These light or dark markings are called honey-guides for they point to where the nectar is stored in the flower. Within the petals are the stamens. These are long stalks

with fat little heads. The heads are the anthers. In each anther there is yellow powder called pollen. In the



*The parts of a Snapdragon flower*

1. Flower.
2. Open flower showing stamens and pistil.
3. Stamens and pistil.
4. Pistil.

centre of the flower is a single stalk without a head. This is the pistil. If you look closely at a pistil you will see that the top green part is sticky. It is the stigma. The swelling at the bottom of the pistil is called the seed-box.

Flowers are wonderfully made. All the flowers on the same plant have exactly the same colour and shape as the rest. Count the number of sepals, petals, stamens and pistils — you will find that they are the same in every flower on the same plant.

Why does a plant have flowers? Why are flowers so pretty? Why do flowers have a sweet scent? Why is

there nectar at the bottom of a flower? Why do anthers make pollen? The answer to all these questions is the same — to produce seeds. Unless seeds are formed, plants would in time disappear from our world, for as the old plants died there would be no new ones to replace them.

### *Things to make and do*

#### *During your ramble:*

1. Collect the different kinds of flowers you see, and make a special collection of honey-guides from them.
2. Open a seed-box with the help of a pin. Search for the unripe seeds. If you find any green anthers, open them up and take out the unripe pollen grains.

#### *Name the part:*

Look at the pictures on the opposite page. Name the part to which the arrow points.

#### *For your wall newspaper:*

Paste on your board the different kinds of honey-guides that you have collected. Under each write the name of the flower.



What do the letters stand for?

1. Red Silk Cotton.
2. Spider lily.
3. Tamarind.
4. Shoe-flower.
5. Easter lily.

*In your note-book:*

Fill in the table below, about as many plants as you can:

Name of Flower	Number of Sepals	Number of Petals	Number of Stamens	Number of Pistils	Shades of Colour

## 5

## *Pollen Carriers*

BUSY bees, bright butterflies and burly bumble-bees—these are the friends of the flowers. Flitting restlessly from flower to flower, these little winged creatures can be seen helping the flowers to form fruits. Flowers that are visited by them, arrange their inner parts, so that when a bee or butterfly enters, it can carry pollen from one flower to another.

Pick a snapdragon flower and carefully look inside it. You will see four stamens curving downwards from the roof of the flower. Between the stamens, curving downwards in the same way, is the pistil. You can tell if a stamen is ripe, for the anther bursts and the yellow pollen dust is clearly seen. Ripe stigmas are sticky. The stamens and stigmas ripen on different days.

When the snapdragon buds burst into bloom the bumble-bee is at once attracted by its brightly-coloured petals. It knows that there will be nectar in the flower. The lower lip of the flower is used as a landing-stage and the honey-guides point the way to the caller. Pushing its way inside, it feasts on the nectar. While it is drinking

its fill, the pollen from the ripe anthers falls on its body. It does not fly to another kind of plant, but remains among the snapdragons. Busily it flies from flower to flower collecting more and more pollen from the ripe anthers. If it flies into a flower where only the stigma is ripe, some of the pollen from its back falls on the sticky stigma. This is exactly what the plant wishes. When this happens, seeds form in the seed-box.



*How pollen is carried from flower to flower*

*Left: Pollen from ripe anthers falls on bee*

*Right: Pollen from the bee's body falls on ripe stigma*

Most flowers like pollen from the flower of another plant (of the same kind) being put on their stigma. In the snapdragon this is done by making the anthers and stigmas ripen on different days. On both these days nectar is made for the bumble-bee. On the first day the

flower gave away its pollen, and on the next day received pollen from another flower.



*Insect helpers at work*

*Bumble-bee*

*Moth*

*Butterfly*

*Honey-bee*

The bumble-bee is not the only insect that wants the nectar in the snapdragon flower. Many other small insects wish to drink the nectar as well. The plant tries

to prevent them from drinking the nectar, as they do not help to form seeds. You must have noticed that the snapdragon flower keeps its mouth tightly closed. Only the big, burly bumble-bee can force its way in. If, however, a small insect does go inside, it is prevented from robbing any nectar by the hairs in the throat of the flower. Once it enters the throat, it will find itself in a forest of hairs and will lose its way.

In the garden you will see other insect helpers busy at work. The honey-bee and butterfly are the favourites of many flowers. Wasps and certain flies also do their share of work. Even at night the work is carried on by moths. Flowers that attract moths are white in colour, and open at night. Some of these night-bloomers fill the night air with their sweet scent.

The carrying of pollen from the anther to the stigma, and how it is brought about, is among the most wonderful stories in Nature. It also teaches us an interesting lesson on how some insects and flowers help one another every day.

### *Things to make and do*

#### *In the garden:*

1. Many birds help flowers in the same way as insects do. Gather under a Red Silk Cotton tree when it is in

full bloom. Count the different kinds of birds that you see feasting on the nectar.

2. Look for: (a) sweet-scented flowers, (b) ripe anthers, (c) ripe stigmas, (d) nectar in a flower, (e) butterflies drinking nectar, (f) bees drinking nectar, (g) small insect thieves, (h) pollen covering the bee or butterfly.

3. Watch butterflies as they flit from flower to flower. Do they visit the flowers of different kinds of plants on the same morning?

*For your wall newspaper:*

Neatly letter on your board these headings:

INSECT VISITORS

BUMBLE-BEE   HONEY-BEE   BUTTERFLY   MOTH

Under each heading stick flowers from the garden, that you have seen being visited by these insects.

*In your note-book:*

Choose any flower in the garden and write about it in this way. Fill in the blanks with whatever you noticed.

MY VISIT TO THE GARDEN

On going into the garden I saw the —— blooming. The flowers were coloured ——. When I smelt the flower I found that it had —— scent. The honey-guides were

— in colour. Looking at the flower I counted — sepals and — petals. I peeped inside and saw that there were — stamens and — pistil. Of these two parts of the flower the — looked ripe. I watched for a while and discovered that the flowers were visited by —. After being visited by insects I noticed that the —, —, and — fell off as their work was done. The seed-box now turned —.

#### *Keep a flower-diary:*

In your diary write the dates on which the flowers in your garden bloomed. Write the names of the insects that have visited these flowers. Make a note of the day on which the fruit ripened. Press garden-flowers and stick them in your diary.

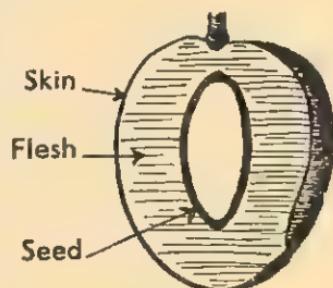
## 6

## *Journey of a Seed*

SUMMER time is mango time. Mango trees that you have never noticed on your way to school, now make your mouth water with the juicy fruits that hang from their branches. Everybody enjoys the tasty flesh of the fruit. Many people make chutneys and pickles from the flesh as well. Nobody eats the seed. This part of the fruit is thrown away.

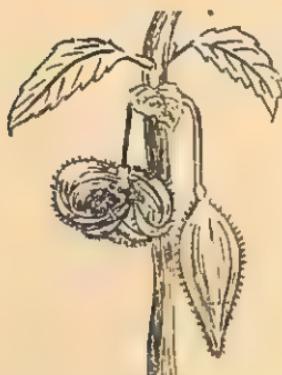
During your visit to the garden you saw how the plant made a little nectar in its flower for the insect visitors that helped it to form seeds.

In the same way some plants cover their seeds with a tasty, fleshy coat, so that you will help to spread its kind far and wide in the country. By flinging away the seed you are rewarding the plant for the food it has given you. Many plants give their seeds



*A Mango cut through*

a fleshy covering. How many can you name?



*The bursting Balsam*

The Garden-balsam spreads its seeds by bursting suddenly. When the fruit gets ripe the pod explodes at the slightest touch and scatters its seeds. On a hot summer's day you will hear the fruits of the pretty Phlox plant cracking and shooting out its seeds in all directions.

Is it not a nuisance having to take out the fruits that get stuck to your socks after a day's ramble in the countryside? Cattle often have fruits clinging to their coats. Do you know the names of the fruits illustrated on the opposite page? Look at them carefully. Have any of them ever troubled you? The plants bearing



*The Red-Silk Cotton*

these fruits spread them by covering each with hooks, prickles or hairs.



*Four Kinds of Clinging Fruits*

*Prickly-chaff Flower*  
*Devil's Claws*

*Tiger's Claws*  
*Spear Grass*

In the month of April the pods of the Silk Cotton tree burst and a shower of fluffy cotton comes sailing down from the branches. Very often the wind helps this plant to spread its kind by carrying the seeds to faraway places. Each seed of the Sunflower has an umbrella of

hairs which help it to be blown away from its parent by the wind.

Coco-nut palms are usually seen growing by the seaside. When the fruit is ripe it falls to the ground below. Now it may be taken by the sea on a long journey.

When it reaches land again, it will grow into a large coco-nut palm. If you look at a coco-nut you will notice its thick coat of fibre, called coir. It is the coir of the coco-nut that helps



*Coco-nut palms*

it to float for long distances on the waves.

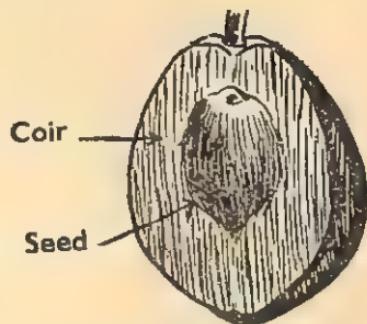
A fruit covered with hooks may ride to its new home on the back of a buffalo. Others may be whirled away in the rush of the wind. Coco-nuts are carried to distant shores by the river and the sea. The pea-pod when dry splits apart, throwing its seeds a long way.

A plant is wonderful in many ways but it cannot

move about from place to place like we do. Only once in a lifetime does it have a chance to make a journey. This is when it is a seed.



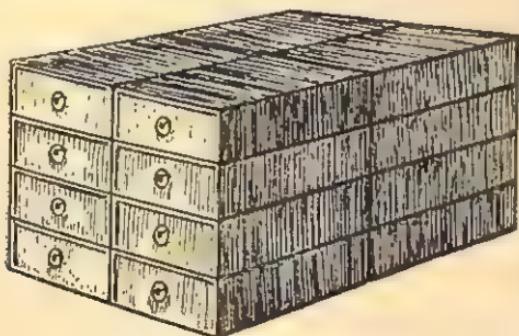
*The fruit of the Sunflower*



*A Coco-nut cut in half*

### *Things to make and do*

#### *During your ramble:*

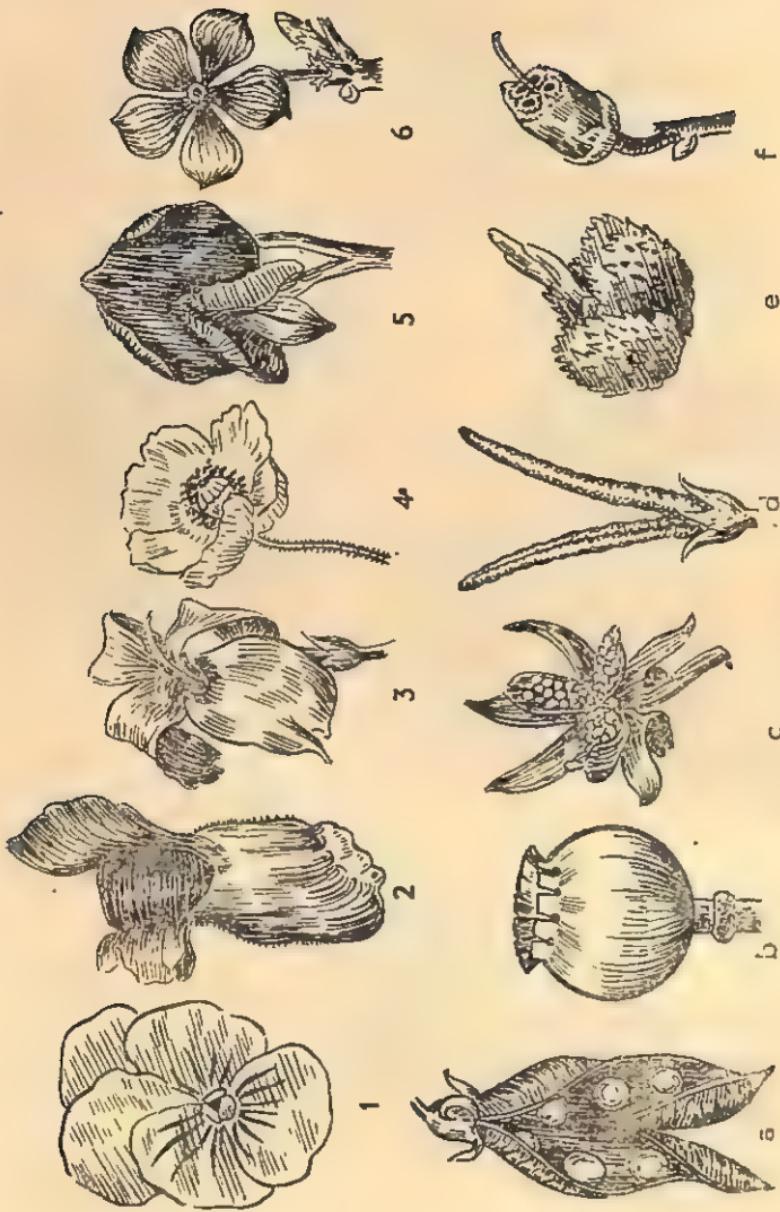


*A chest of drawers, made from match-boxes and beads, for storing fruits*

1. Find some of the fruits described in this chapter.
2. When you find a fruit tell teacher how you think the seeds are scattered.
3. Collect different kinds of fruits for your museum.

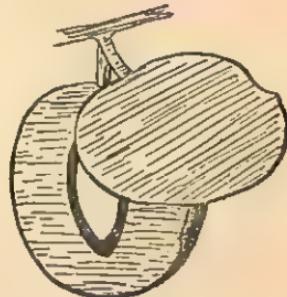
*Link the Flower with the Fruit*

Top Pictures: (1) Pansy. (2) Snapdrag. (3) Canna. (4) Puppy.  
(5) Sweet Pea. (6) Periwinkle.



*For your wall newspaper:*

Draw a number of fruits as they would look when they have been cut through. On page thirty-three you will see an example of such a drawing. Choose the proper shade of coloured paper and cut out the shape of the fruit so that it will fit your drawing. Now stick the coloured paper over the drawing as shown in this picture. When the work is complete you will have a good idea of what fruits look like on the outside as well as on the inside.

*Link the flower with the fruit:*

On the opposite page the artist has drawn the flowers and fruits separately. If you have watched flowers changing into fruits you should be able to do this puzzle quite easily.

*A folding model**In your note-book:*

Give four examples of each of the following: fruits that burst open suddenly; fruits that are eaten; fruits that cling to the coats of animals; fruits that are blown about by the wind.

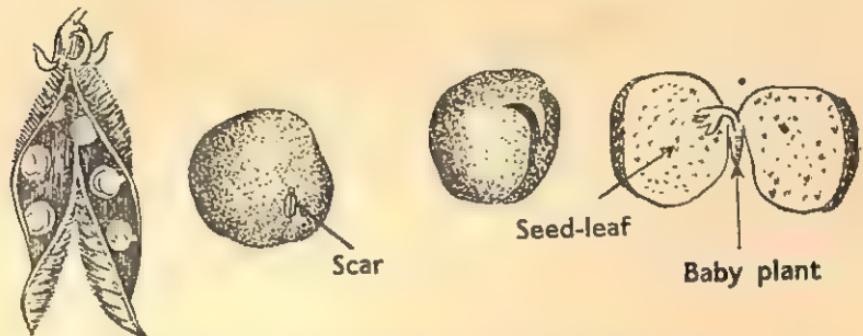
## 7

## *How Plants are Born*

IT IS hard to believe that all the plants growing on our earth have come from tiny seeds. Yet this is the truth. You have seen how the plant gets the help of the wind, water and animals to spread its seeds far and wide. When the seeds end their journey and arrive on the earth, they wait for a proper time to give birth to the baby plants inside them. Every parent plant sends its baby away, well protected by a tough coat and a little store of food that will feed it until it is old enough to get its own food. The tough coat, the food-store and the baby plant can be seen when a seed is opened.

Collect a few pea-pods. If you pluck a seed from the pod, you will see a little white scar. This scar shows the place where the pea was joined to its pod. To take off the coat covering the seed, you must soak the seed in water. After some time the coat of the seed will become loose. When you peel it off the two thick green halves that make up the seed will be seen. These two halves are

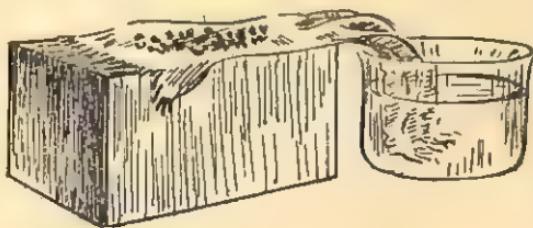
the seed-leaves. They are swollen because they contain food for the baby plant. Carefully separate the two seed-



*The Pea-pod and Seed before and after the coat  
has been removed*

leaves and you will find the baby plant. With care, this tiny plant will grow into the pretty pea plant found climbing its way along in your garden. In its turn it will bear seeds that you may eat one night for dinner.

Would you like to watch a baby plant come out from the inside of a seed? Try this experiment. Put one end of



*The towel experiment*

with a plate. At first a tiny root pushes its way out from

an old towel in a bowl of water. Spread the other end on the top of a box. Place a few seeds on the towel and cover the seeds

the inside of a seed. It is followed by the young stem which bears a few leaves. In this way the baby plant slowly comes out from a seed. As the tiny plant grows you will see the seed-leaves turning smaller and smaller. The food contained in them is being used by the plant



*The birth of the Pea plant*

baby to help it to grow. When all the food is finished the young plant will die. You could save its life by planting it carefully in the garden and caring for it. Once the tiny roots are in the earth they will take in food from the soil and continue to grow.

### *Things to make and do*

#### *Outdoors:*

1. During the monsoon you may find baby mango

plants growing in the school compound. Carefully pull them out of the ground, and look for the seed-leaves. Can you say how these baby plants have found their way to the place in which they are growing?

2. Prepare a small plot in your garden and plant a few bean seeds. Visit the spot every day to see if the young stems have come out of the ground.

3. Open as many seeds as you find and look for the seed-leaves and the baby plant that is tucked between them.

*For your wall newspaper:*

Search for and draw:

- (a) The parts of a gram seed.
- (b) A young bean stem forcing its way out of the soil.
- (c) A young mango plant that has been taken out from the ground.
- (d) A baby pea plant after the seed-leaves have fallen off.

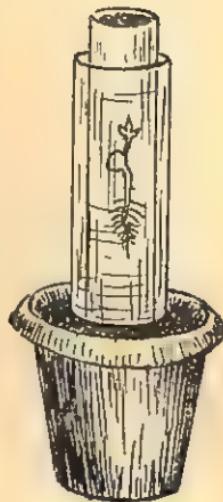
*In your note-book:*

Discover and jot down the number of days:

- (a) The little pea root takes to come out of the seed.
- (b) The little pea stem takes to come out of the seed.
- (c) The seed-leaves take to fall off.

*At home:*

Grow a bean seed between a lamp chimney and a roll of blotting paper. To do this you must first fill a flower-pot with soil, and fix a lamp chimney as shown in the picture. Roll a sheet of blotting paper against the inside of the chimney. Fill the inside with sawdust, and keep it damp by pouring a little water on it every day. Now watch the results.



*The chimney  
experiment*

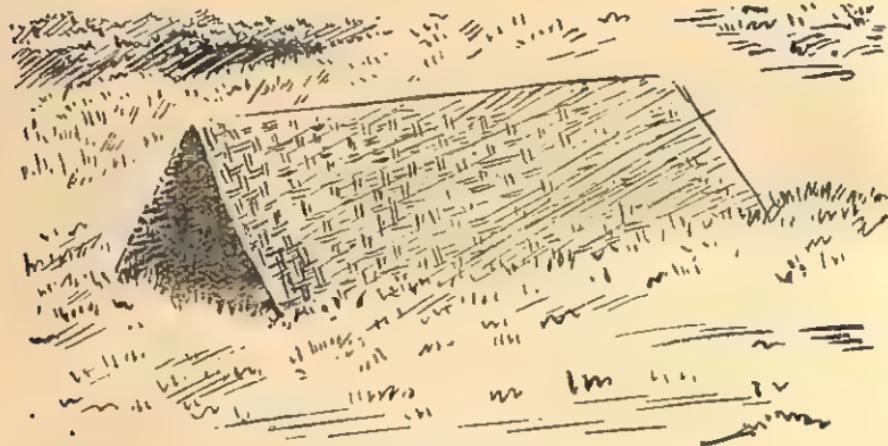
## *Caring for Your Garden*

EVERY day there is something new and wonderful happening in a garden. Buds may open and show you their lovely flowers. You might be lucky to see a pollen carrier at work. A plant may send its babies on their travels. Seeds may send their first few leaves above the ground. Life in a garden is full of interest.

It is very exciting to make your own little garden at home. Plants need a great deal of care. It will be your task to watch over them, and give each plant whatever it needs. There are plants that need a lot of light, while others like shade. Some like a great deal of water, while some do not. Twiners need a trellis to climb, a rambler prefers an arch.

Find a suitable place in your compound to make a garden. As most plants like sunlight, choose a sunny spot. Digging is hard work, but it must be done. Dig deeply, if you want your garden to be a success. Mix manure with the soil and be careful to keep the soil loose.

The best time for planting seeds is at the beginning of a season. A gardener will tell you what seeds will grow best at that time of the year. When sowing, it is important to leave a little distance between the seeds, for each plant must have plenty of room in which to grow. See that



*A Plant Nursery*

the soil is not lumpy nor powdery. The hole for each seed should not be more than one inch deep. Remember that young plants will die if they are allowed to have too much sunshine. Gardeners usually cover them with matting to shade them from the hot summer's sun.

Transplanting is the name given to the moving of young plants from the nursery to their permanent home. This is best done on cloudy days; windy days should be avoided. When transplanting, lift the young plants with

plenty of damp soil around their roots. Be careful not to damage the little roots. After replanting the young plants be sure to water them at once.

A question that often puzzles young gardeners is the amount of water that plants need. Some plants need never



*With the rose*



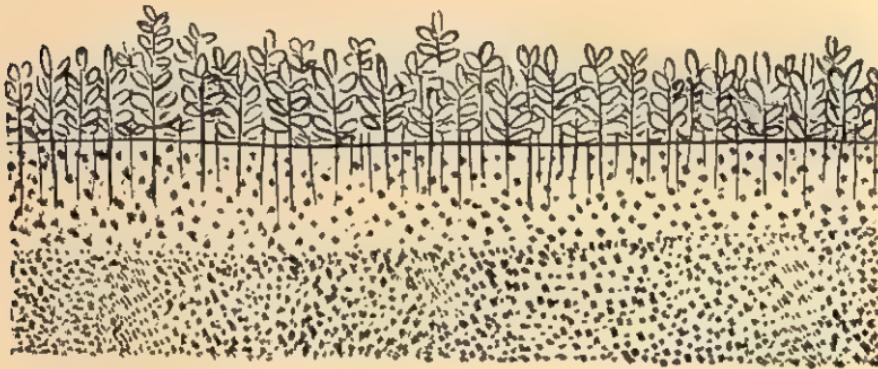
*Without the rose*

be watered. Plants need water if their leaves droop. In these pictures you will see the proper ways to water plants. Small plants should have water sprinkled over them. When watering tall plants, however, the rose of the watering-can may be removed. Gardeners choose the late evening for watering their plants. Can you say why?

You must visit your little garden every day to see if weeds have entered in among your plants and taken root. Weeds take in food from the soil, and unless they are removed, there will be very little food left for your garden

plants. The best way to deal with weeds is to pull them out with your hands. If the roots are allowed to stay in the ground, they will continue to give you trouble.

Around your plot of flowers you could plant a hedge.



*How to plant a hedge*

Dig a small trench and in it plant cuttings from a hedge. Soon the cuttings will take root and add to the beauty of your garden. Trim the hedge regularly and guard it from weeds.

If you live in the heart of the city and have no space for a garden, do not give up hope. Buy a few flower-pots and grow plants in them. A new pot should be washed and then allowed to dry. Cover the hole in the bottom of the flower-pot with some broken pieces of pot. Over this put manure and last of all the soil. Do not fill soil

up to the brim. Stand your flower-pot on a few bricks, so that the extra water will flow away.



*Potting a plant*

Beautiful flowers are a gardener's reward for all the pains he has taken. Spend a little time every day caring for your garden, and you will find that there is nothing more wonderful than watching Nature at work.

### *Things to make and do*

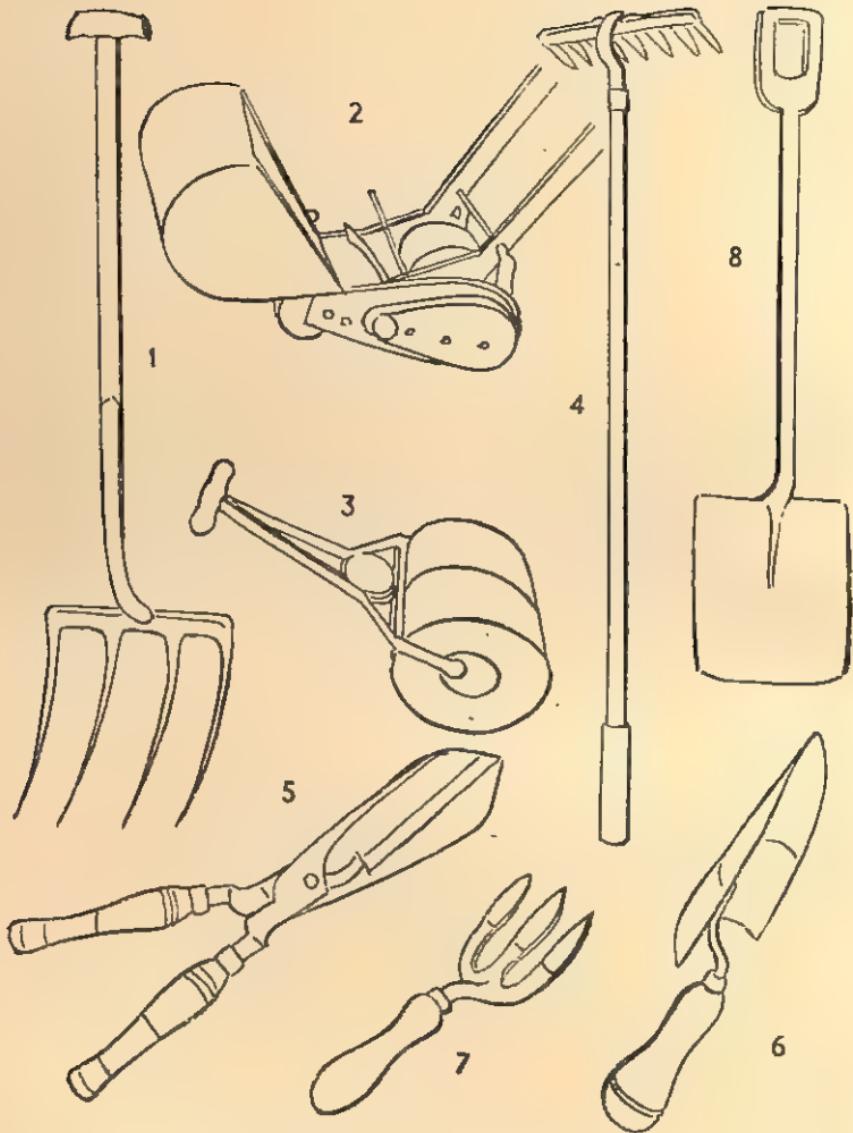
#### *In the garden:*

Meet the gardener and find out for yourself:

- (a) Which plants need shade.
- (b) The names of the climbers.
- (c) The best manure to use.
- (d) How to mix manure with soil.
- (e) The way transplanting is done.
- (f) The amount of water each plant needs.

#### *In your note-book:*

Copy the drawings of the tools on the next page, and write beneath each its use to the gardeners.



*The Gardener's Tools*

1. Fork.
2. Lawn mower.
3. Roller.
4. Rake.
5. Shears.
6. Trowel.
7. Weeding Fork.
8. Spade.

*For your wall newspaper:*

Cut out flowers from old gardening magazines and bring them for your board.

*Have a flower-show:*

At the end of term hold a flower-show. Ask teacher to judge who has grown the best flowers.

## 9

## *The Gardener's Foes*

LIVING in the garden, among the plants are a number of creatures. They are to be found under the ground, beneath stones, on leaves, in flowers and on the tree-tops. A few of these creatures are the friends of plants but many are foes. Other animals are tempted by the juicy leaves and bright flowers to wander in the garden.

Among the gardener's enemies the one we all know best is the caterpillar. In the monsoon when plants grow plentifully caterpillars are to be seen gobbling up the leaves. These little greedy creatures never seem to grow tired of eating.

Cows, buffaloes, pigs, goats, and in some parts of our country, even sheep, may completely destroy a garden in a few hours. On entering a garden you must always lock the gate behind you to prevent these animals from straying in.

Slowly dragging themselves along and leaving a silvery trail behind them are the slugs and snails. You can easily

tell the difference between them for the snail carries its house on its back. These creatures hide by day and feed on plants by night.

*Leaf eaters*

1. Caterpillar.
2. Slug.
3. Snail.

Many animals are tempted by fruits hanging from the trees. Gardeners sometimes tie an old tin-can to the top of a tree. A rope is then tied to the can. When the rope is pulled the can rattles and frightens away the squirrels and birds that will otherwise eat the fruits.

Monkeys may make a raid on the fruit-trees and cause great trouble to the gardener. Even though they are driven out time and time again they return to do more damage.

You must have seen a group of flying-foxes hanging upside down and fast asleep on the tree-tops. At the close of each day a long procession of them wings its way to search for fruits. These greedy creatures ruin the fruits



*A Flying-Fox Colony*

mies. It will be your duty to watch for them among the plants you grow. There are a large number of beetles and other tiny insects that do great harm to the helpless plants. Protect your garden against these enemies.

they eat. Very often they hardly finish eating one fruit before they start ruining another. Due to their evil habits and because they make a tasty dish on our tables, men go out with guns to shoot flying-foxes.

As all gardeners know, plants have many en-

### *Things to make and do*

#### *In the garden:*

Here is a short list of signs which tell you that enemies of the gardener have been at work.

- (a) Slimy tracks.
- (b) Half-eaten leaves.
- (c) Plants that have been nibbled.
- (d) Hoof-prints.
- (e) Wasted fruits on the ground.
- (f) Holes in seeds.
- (g) Stems with tunnels running through them.
- (h) Plants destroyed by trampling.

Are there any of these signs to be seen in your garden?

Do you know the name of the creature that made it?

*On your wall newspaper:*

Stick, pin, or nail to your board, parts of plants that have been damaged by the gardener's foes. Cut out from coloured paper the shapes of the different enemies of the gardener and stick the pieces around the things you have already mounted. Connect with arrows those parts of plants which have been eaten with the pest which caused the damage.

*In your note-book:*

Copy these sentences. Against each one write *True* or *False*.

1. Caterpillars come out of the eggs of a butterfly.
2. Flying-foxes drink the blood of animals.
3. Squirrels live in holes in the ground.
4. Earthworms eat dead leaves.

5. Birds dislike all caterpillars.
6. Some insects suck the juices from stems and leaves.
7. Monkeys are frightened away by a scarecrow.
8. Flying-foxes lay eggs.
9. Toads are the enemies of slugs.
10. Monkeys feed on leaves.

*Picture-Puzzle:*

This monster is made up of five garden animals. How many of them can you name?



*Have you seen this monster in your garden?*

## *The Gardener's Friends*

IN THE garden you have already met a few friends of the gardener going about their daily tasks. These are the pollen carriers. If they did not go from flower to flower the plant would not bear seeds. The gardener collects these seeds and grows plants from them. Besides the pollen carriers the gardener has other friends that kill and eat his enemies.

Have you seen a ladybird? It is a small orange-coloured beetle with black spots on its back. This pretty little beetle helps the gardener by eating tiny insects called plant-lice.

Hovering over the plants and hunting for insects are dozens of dragon-flies. Their gauzy wings help them to dart about swiftly, and with their bulging eyes they are able to spy their prey from afar.

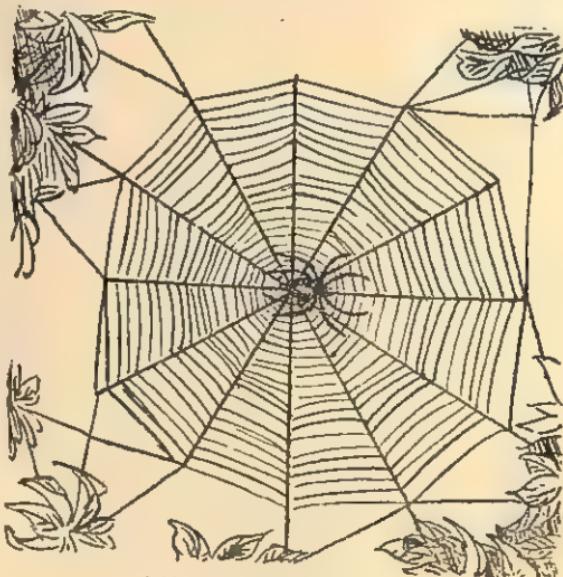


*The Six-spotted  
Ladybird*

*The Dragon-fly.**The Wasp*

Some wasps help to carry pollen when they visit flowers to drink nectar. They also help plants by carrying away insects to feed their little ones who are in the hive.

The garden spider builds a cunning trap to catch insects. You will find this little creature waiting in its web for an unwary visitor. In the twinkling of an eye the spider pounces upon the insect, that has become tied up with the sticky threads of the web.

*The Garden Spider*

During the rainy weather when insects become plentiful you will hear the toad croaking happily from the tank.



*A Frog gets its prey*

of you to frighten away birds from your garden. If you do, insect pests will multiply and finally destroy your plants.

Did you know that the earthworm is the gardener's friend? You may have seen the gardener turning up the soil with a sharp tool. Well the earthworm helps him to do this work. By its continual burrowing in the soil, air is let into the ground. The roots of plants use this air to breathe. Dead leaves are very often used as manure by the gardener. Earthworms feed on dead leaves and take their food into the earth. When the earthworm moves along inside the earth it turns up the soil, mixing it with

Toads and frogs are truly the gardener's friends. Their tongues shoot out of their mouths to catch insects. At night slugs move carefully for they know that frogs are on the look-out to eat them.

Most insects do great harm to our garden plants. Birds are soon forgiven for the few fruits they might destroy, because of the large number of insects they eat. It will be very unwise

its food. Here again the gardener is helped by his little friend.

Garden plants suffer very greatly from the many pests that do them harm. Luckily for the gardener there are other creatures in the garden who feed on these pests and destroy them. Look for these creatures and learn their names, for they will help you to keep your garden beautiful.

### *Things to make and do*

#### *In the garden:*

Make two lists: one of the gardener's friends and the other of the gardener's foes. Write only the names of the creatures that are found in your garden.

#### *For your wall newspaper:*

Choose any drawing of a gardener's friend or foe from these last two chapters and copy it. The best drawings will be pasted on the board.

#### *In your note-book:*

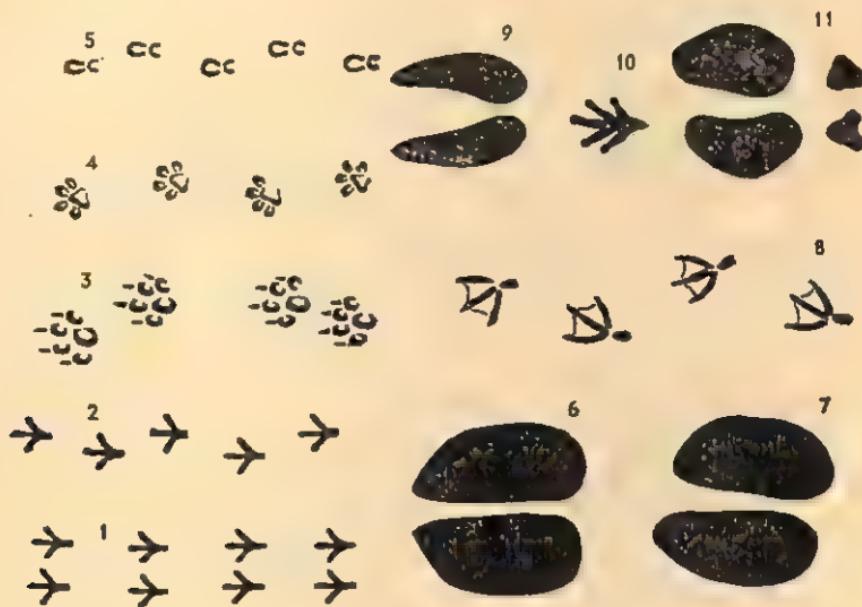
Which of these creatures: bees, birds, buffaloes, bumble-bees, butterflies, caterpillars, cows, dragon-flies, flying-foxes, frogs, goats, ladybirds, monkeys, moths, sheep, slugs, snails, spiders, squirrels, toads, wasps —

(a) Eat caterpillars.      (b) Eat dead leaves.

(c) Eat fruits.	(d) Eat leaves.
(e) Drink nectar.	(f) Eat plant-lice.
(g) Eat insects.	(h) Eat slugs.

*Footprints in the Garden:*

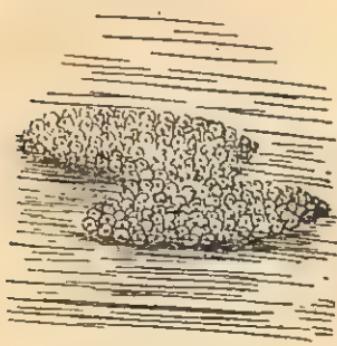
Pretend you are a detective. Suppose you saw these tracks in your garden one morning, how many would you know?



Have you seen any of these foot-prints in your garden?

## *From Egg to Frog*

OUR familiar friend the frog is sadly missed by the gardener during the summer and winter months. At this time of the year the little creature is lying fast asleep in the mud at the bottom of the pond. In its body there is a store of food which is slowly used as the months go by. When the monsoon arrives, the frog is up and about from the very first downpour. The croaking of frogs and their cousins, the toads and bull-frogs, can be heard clearly on monsoon nights.



*Frogs' eggs floating on the water*

grouped close together. After a few days little black tadpoles wriggle out of the eggs and cling to water-weeds.

Within the first month of the rainy weather, frogs' eggs will be seen floating on the water. They look very much like jelly, and a number of them are

*Left:*

*Tadpoles wriggling out of their eggs.*

*Right:*

*Tadpoles clinging to water-weed.*



*Left:*

*Tadpoles with gills.*

*Right:*

*Tadpoles without gills.*



*Left:*

*Tadpoles with hind legs.*

*Right:*

*Tadpoles with two pairs of legs.*



A few days later the tadpoles turn very lively and swim about in the tank. These little fish-like creatures have a pair of beady eyes and a small beak for a mouth. Before long they go in search of tiny water-plants, for their food.

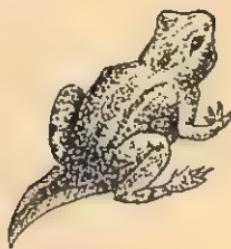
At first each tadpole has two feathery gills on either

side of its head. When these fall off breathing is carried on by gills inside its head. At this time it not only eats

water-weeds but small animals as well. Very little tadpoles have to beware, because they may be eaten by bigger tadpoles.

After some weeks the hind legs push their way out of the tadpole's body. This is the first sign that the tadpole is changing into a frog. More weeks go by before the front legs are seen. Now we do not call the little creature a tadpole any longer for it has grown into a baby frog.

The baby frog shows a liking for the land and will spend a little time every day on the side of the tank. The lungs that



*Top picture: a baby frog  
Centre picture: a young frog with its cast skin  
Bottom picture: Mr. Frog*

are now inside its body help the frog to breathe on land as we do.

As it grows its coat gets tight, splits and falls off. Its new coat looks smart and has the same colour as the plants growing around the tank. The young frog's tail becomes shorter, and soon it looks just like its parents.

When you next go fishing keep your eyes open for tadpoles and rear them at home. You will enjoy watching all that happens while a tadpole becomes a frog.

### *Things to make and do*

#### *Outdoors:*

1. Keep a watch for frogs' eggs and tadpoles. You can collect the eggs with the help of a tin-can tied to the end of a long pole. Use a small fishing-net to catch tadpoles.

2. During the winter months carefully turn up any large stone that you may find in the compound. You may be lucky to see a toad enjoying its winter sleep.

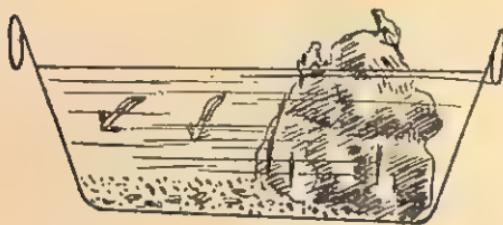
#### *For your wall newspaper:*

Make a record of all the changes that happen when a tadpole grows into a frog. Write the date and draw a picture of each new change.

#### *Rear tadpoles in the class-room:*

Find an old tub which does not leak. Fill it with water

from the tank. Now select a few large stones that are covered with moss, and put them inside the tub so that they are just above the water. See that there are a few water-weeds in the tub. When you find any frogs' eggs or tadpoles put them into your little 'tank'. You will



*Tadpoles in a tub*  
into very small pieces and give it to them.

*In your note-book:*

In your home made 'tank' you will see tadpoles:  
 (a) feeding on water-plants, (b) having feathery gills,  
 (c) coming out of eggs, (d) eating a piece of meat,  
 (e) with only two hind legs, (f) hanging from water-weeds.

Re-arrange the above in the proper order in which they happen.

find that when your tadpoles are beginning to change into frogs they will like a piece of meat.

Chop some meat

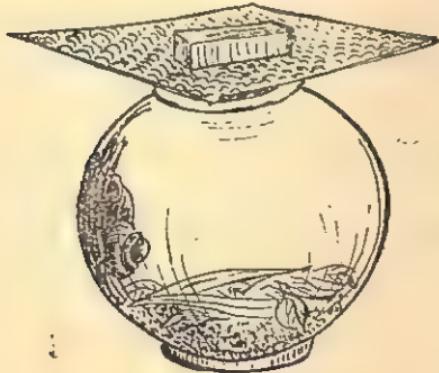
## I 2

### *Snails and their Relatives*

'As slow as a snail' is often said of anyone who takes a long time to do anything. Snails do indeed travel very slowly. Moving only a little faster than the hands of a clock they hardly seem to be travelling at all.

Search for a snail in your garden and when you find one, place it in a glass bowl. Put a little damp soil at the bottom of the bowl and cover the top of the bowl

with wire-mesh. Keep the mesh pressed down with a heavy stone. Once the snail gets on to the side of the glass bowl you will clearly see its large foot. As it slides along, it makes a wave-like movement with its foot and leaves a slimy



*A Snailery*

trail behind. When the slime dries it has a silvery gleam.

Give the snail cabbage leaves to eat and watch the way it feeds.

The snail is a very timid creature and will immediately go back into its hard, hollow shell when disturbed. Here its soft body is safe from any danger. If you break open an old shell you will see that in the centre is a pillar. The snail coils its body around this pillar.

By day snails hide under stones, leaves or in cracks in the wall for they cannot bear the sun. If the day is cloudy and wet you will find them feeding in a dark spot. In the cool of the evening you will probably find them wandering in the garden.

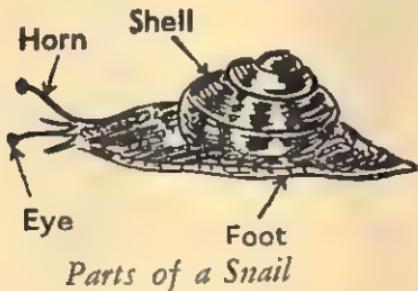


*How a snail's shell looks when  
it is cut through*

As the snail grows, its shell grows too. The dark lines that you see on the shell are lines of growth.

There are four 'horns' at one end of the snail's body. Each horn is a feeler and,—here is a wonderful thing—they fold inwards like the fingers of a glove. At the very tips of the two long feelers the snail has its eyes. In spite of having eyes the snail cannot see very well but it can, however, tell light from darkness. With its feelers

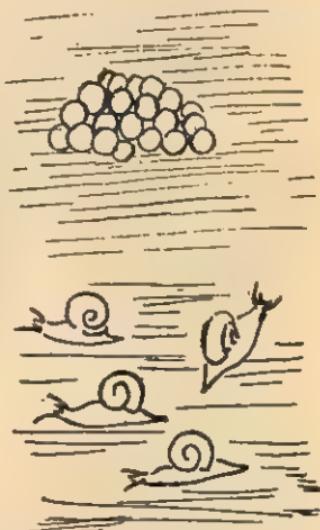
it feels its way as it glides along. The feelers also help it to smell its food.



Snailery. Tiny snails with still more tiny shells on their backs will hatch out of the eggs.

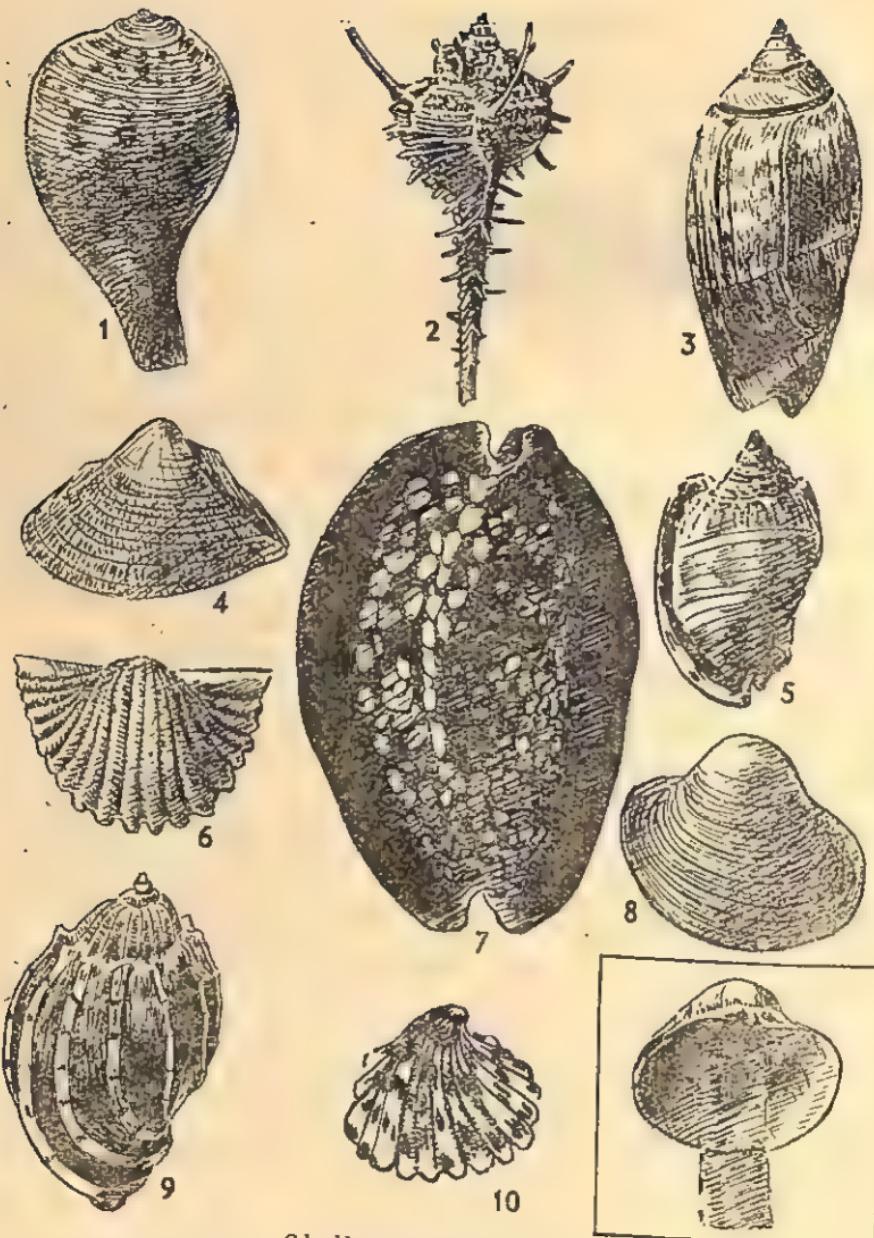
Like the frog the snail is a great sleeper. All through the monsoon it feeds and turns quite fat. Then when winter arrives it buries itself in the ground. Now it shuts up the door to its shell with a thick coat of slime. The slime hardens into a tough skin which keeps the little creature cosy and safe from the cold.

As you have read in another chapter the snail is an enemy of the gardener for it eats his plants at night. Gardeners try to keep the creature from doing any damage by building a small mound of soot or lime around each plant.



*Top picture: A Snail's eggs*

*Bottom picture: Baby Snails*



*Shells of the Seashore*

1. Fig. 2. Thorny Woodcock. 3. Olive. 4. Wedge. 5. Helmet.
6. Scallop. 7. Cowrie. 8. Venus. 9. Harp. 10. Cockle.

Inset: How to mount a shell on your wall newspaper.

*Things to make and do**In the garden:*

1. The best time to look for snails is during the rainy weather. Try to follow the trail of a snail. You might find a snail in this way.
2. If snails are difficult to find, lay this trap for them. Place lettuce leaves, orange-peel, or slices of potato and turnip on the ground in your garden. The next morning see if there are any snails underneath.

*For your wall newspaper:*

Snails have many relatives that are found in rivers, tanks and seas. Those of you who are lucky to spend a holiday by the sea could gather the many shells that are scattered on the shore.

With the help of gummed paper stick your shells neatly to your board. Large shells could be hung on nails that are hammered into the board.

In the school library you will probably find a book on shells. Try and find the names of the shells you have collected by looking for their pictures in the book. Keep the shells for your class museum after you have displayed them on the board.

*At home:*

People say that snails can find their way home from

wherever they may have wandered. Find out if this is true. Mark a snail by scratching on its shell. Fling it as far away as you can. Does it come back to your garden?

*In your note-book:*

Answer these questions:

1. Do you know the months in which snails are to be found?
2. How far does a snail move in ten minutes?
3. What happens if you touch a moving snail with the point of a pencil?
4. What is the shape of a snail's shell?
5. What is the colour of the growth lines on the shell?
6. Can snails mend their own shells if a small piece breaks off?
7. Does a snail make any noise when it eats?
8. During what months does a snail lay its eggs?
9. How does a snail keep warm in winter?
10. Can you name a relative of the snail that is found in the garden?

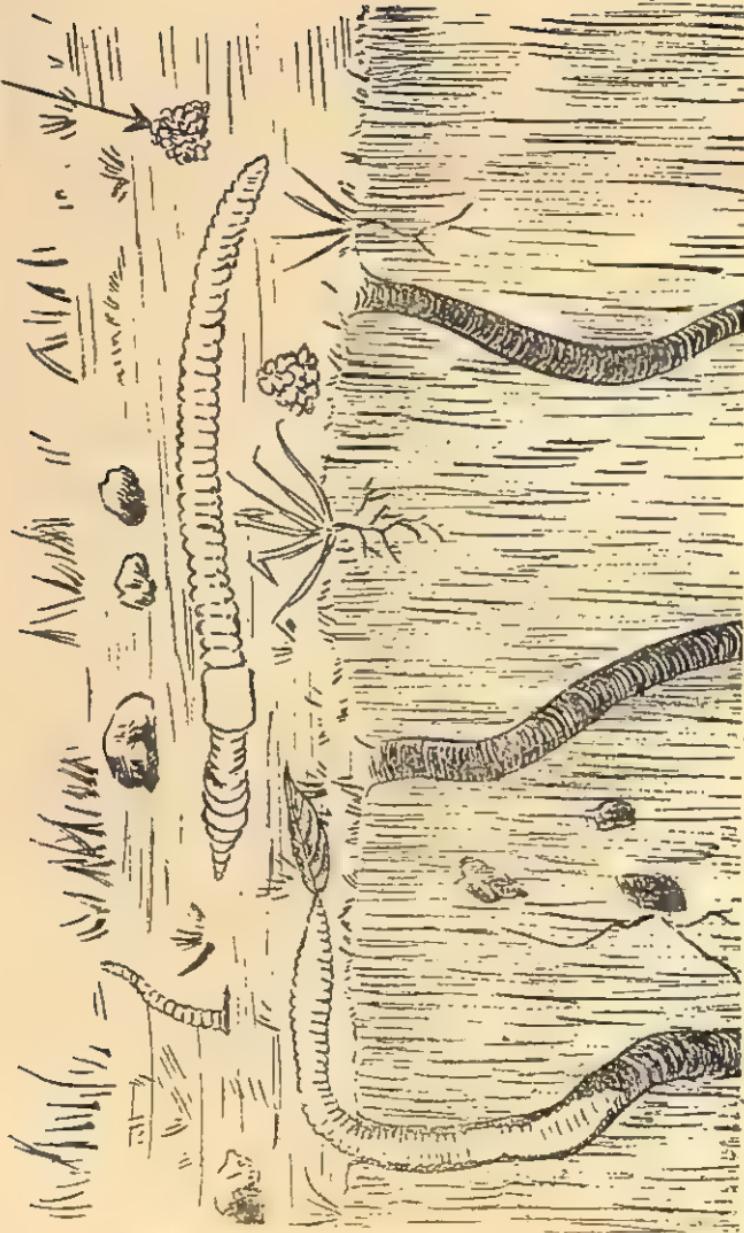
## *Burrowers in the Soil*

JUST AS wonderful as the creatures that live on the earth, and perhaps even more wonderful, are the little creatures that live inside the earth. Here in the soil you will find long, narrow tunnels, in which live the earthworms. These worms do not always return to the same tunnel after their wanderings, but if they want to go back into the earth, they simply eat their way through the soft soil, and in they go.

The tiny worms that live in the earth have no means of protecting themselves against their enemies and so they come out of the soil when their foes are asleep. At night they feed on dead leaves and hurry back into their burrows in the early morning. If they are late in returning an early bird might eat them. Only small mounds called worm-casts, are the signs left behind to show where the earthworms fed. After food has passed right through the earthworm's body it forms these curly worm-casts. If you squeeze a tube of

*How Earthworms live*

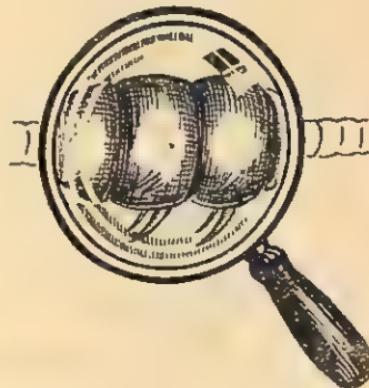
Worm-cast



tooth-paste you will understand how worm-casts are formed.

The earthworm spends the day in its burrow. Here it keeps a store of dead leaves to feed on when hungry. A heavy shower of rain might wash the little creatures out during the day. When this happens the birds are happy and prepare for a feast. Those earthworms that crawl on to a tarred road are usually unlucky. They might find it difficult to get back into the soil, and, as a result shrivel and die in the hot sun.

The wet slimy skin of an earthworm is the most wonderful part of its body. By means of its skin the earthworm can breathe, feel, and also tell day from night. There are rows of tiny, stiff hairs on the body of an earthworm. These hairs help it to pull itself in and out of the ground. Very often it feeds with half its body out of the ground. When a bird pecks at it only half the worm may come away in its beak. The worm does not worry, for



*Part of an earthworm's body made very large with a magnifying glass*

nature has given it the power to grow a new head!

A small part of the worm's body is coloured red. This is called the saddle. The worm can slip this saddle over its head in very much the same way as you take off your shirt. A few eggs from the worm's body pass into the saddle. The worm now wriggles itself out and the saddle closes at either end forming a cocoon. Only one egg hatches into a baby worm. An earthworm's baby can take care of itself from the moment it is born.

Every garden has earthworms going in and out of the soil. If it were not for their wonderful habit of ploughing the soil, the plants growing in your garden would turn sickly and die. Gardeners cannot do without the help given to them by nature's little ploughmen.

### *Things to make and do*

#### *Outdoors:*

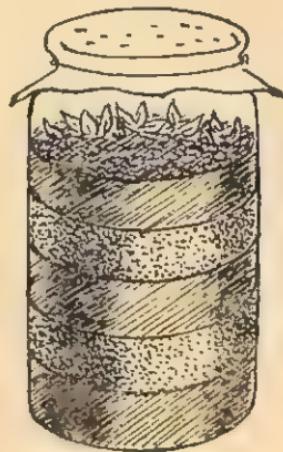
1. Look for worm-casts and worm-holes in the rainy weather.
2. When you find an earthworm see if you can tell its head from its tail. Point out the saddle to teacher.
3. Feel the bristles on a worm's body by stroking it from back to front. Do you find any difference when you rub your fingers on the top and bottom parts of its body?

4. Place a worm on a sheet of rough paper and listen carefully. Do the same with the worm on a wet pane of glass.
5. Notice what happens to the earthworm's body as it moves along.
6. Go out quietly just after dusk to a patch of damp ground. Search for worms with the help of a torch. When you find one flash the torch on it and see what happens.
7. When digging in your garden you probably will find little yellowish cocoons. Bring them to school to show your classmates.

*Make a wormery:*

Fill a large jar with sand and damp mud in equal layers. Level each layer before you add the next. Now put inside a few earthworms and some rotting leaves. Cover the bottle with a cap of brown paper and keep it in a dark cup-board. Pierce holes in the cap with a pin to let fresh air into the jar.

Your wormery will help you to see for yourself how an earthworm lives, and what it does to the soil.

*A Wormery*

*For your wall newspaper :*

By cutting coloured paper into the proper shapes and sixes copy the picture on page seventy-seven.

*In your note-book:*

Choose ten words from this list which tell us something about what the earthworm does:

Pushes, smells, feels, sees, scratches, wriggles, hears, ploughs, hides, walks, stretches, drinks, calls, tastes, creeps, breathes, thinks, stores, feeds, swims.

## *Favourites at the Zoo*

WHO does not like watching the monkeys at the zoo? The cages in which these animals are kept always have a crowd around them. It is dangerous to go too close, for the monkeys in the cage are wild and may bite your hand. Whether they are swinging, fur-picking, eating, fighting, or loving their little ones — monkeys always interest us.

The zoo is not the only place where monkeys are to be found. When travelling by train you may see them in a field damaging the farmer's crops. Then again you are able to see them among the trees in a jungle. Some cities in India are crowded with monkeys. Here they have become very bold and are a thorough nuisance. They sometimes spend their time ruining a garden or stealing food from shops. Many people have tried their best to get rid of these pests but have always failed.

You must have watched monkeys walking on the ground. They have four hands, each one like our own.

Their hands are very useful for picking up and holding things. On the ground their walk is clumsy; but watch them travel through the trees. How nimbly they spring from one branch to another and leap so easily from tree to tree. Here they are happiest. They are good swimmers too and never hesitate to cross a stream if necessary.



*The Bengal Monkey*

It is the monkey's habit of stealing food that has given it a bad name. As if from nowhere a tribe will suddenly arrive and completely destroy a group of fruit-trees. Chattering excitedly in the branches they munch the flowers, fruits and leaves as fast as possible, for they do not know when the angry owner will appear. One kind of monkey stuffs its food into two little bags on either

side of its mouth, storing it in this way to be eaten later.

In the forest monkeys live at peace with almost all the other wild animals. The largest of snakes called the python likes to eat a monkey for its dinner. The poor monkey has no chance at all to escape the deadly coils

of the snake.

Crocodiles found in our rivers come slyly out of the water to seize and eat monkeys. The enemy who frightens it most is the panther. With a sudden loud roar it puts the whole troop to flight. One poor creature might be caught by the panther who, like a cat, can climb trees.



*The Hanuman Monkey*

Monkeys can see far and well. They are always ready for dangerous foes and hide by drawing branches

in front of themselves. If they hear one of their number give the alarm-signal, away they go leaping and bounding as fast as they can. Some monkeys are fierce and will stay to fight their enemies; but they always fight together as a pack. In the midst of the fight they help the injured ones and protect their young.

### *Things to make and do*

#### *At the Zoo:*

- 1: Feed a spider or a caterpillar to a monkey and see if it will eat it.
2. Watch how monkeys use their fingers to eat bananas and nuts.
3. Find a monkey which stuffs its food into the two little bags on either side of its mouth.
4. Look for the enemies of the monkey.
5. Watch how monkeys use their hands when walking and when swinging.

#### *For your wall newspaper:*

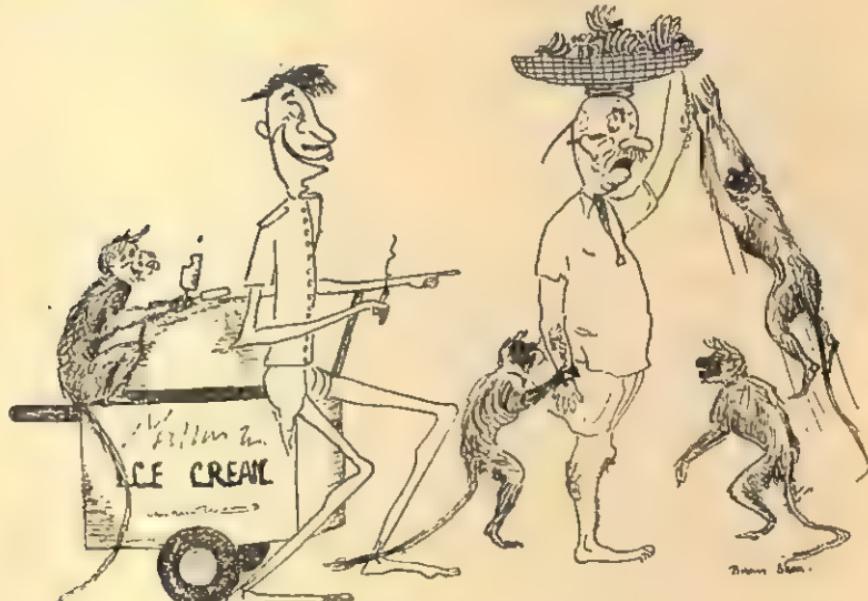
Take photographs of the different kinds of monkeys found at the zoo and mount them neatly on your board.

#### *In your note-book:*

Write down three ways that monkeys are like people and three ways in which they are different.

*Make your own jungle-book:*

The jungle has many different kinds of animal folk with strange ways of life. We are never tired of watching these animals in the zoo and the museum. Look for animal pictures in old nature books and magazines. Paste them into a scrap-book.



*Monkeys in the city*

## *A Furry Animal*

**A**LMOST every garden has its family of squirrels. Leaping from branch to branch and giving their excited shrill calls they are very interesting animals to watch. Sometimes you may see them basking in the sun on a garden wall. When they do this they flatten themselves against the wall and enjoy a sunning. This common garden animal is named after the number of stripes on its back. It is called the Five-striped Palm Squirrel. Its jungle cousin has only three stripes on its back.

When a squirrel climbs up or down a tree it goes head first and spreads its legs apart so as to clasp as much of the trunk as it can. Its sharp little claws help it to cling safely to the bark.

Anyone who has watched squirrels will tell you that they have certain roads to and from their home and almost always follow these paths. Such a path may be only in the tree-tops, with air bridges from a certain branch of one tree to a certain branch of another. There may also be a path on the ground between trees which the squirrel knows and follows. A squirrel that is

uncertain of the way or sets out to explore new ground will tread carefully, stopping every now and then to peer about and see if the way is safe.

People who grow fruit-trees dislike the squirrel as it destroys their fruit; so they drive away these unwelcome visitors. Squirrels do not only eat fruits. Nuts, tender young shoots, buds and bark are all favourite dishes with these lively animals. Even the dreadful prickly-pear bush is visited for its fruits. When these ripen you will see squirrels with red stains on their mouths and feet. The eggs of birds are also eaten by these creatures. When mother bird leaves her nest for a little while, sometimes a squirrel enters and steals her eggs.

A squirrel nibbles its food like its near relative the rat.

Very often it sits on its haunches, holds its food between

its front legs and gnaws away. Its front teeth are specially made to help it to do this. These teeth are like the chisels you find in daddy's tool-box. There are two of these chisel-like teeth on the top jaw. Perhaps you can think of other



*The Squirrel's Teeth*  
animals that gnaw their food as well.

You will sometimes see an untidy nest of grass, leaves and coir in the branches of a tree. This is probably the

nest of a squirrel. Other nesting places that are



*A Squirrel's Nest*

chosen by Mrs. Squirrel are holes in the wall, hollows in a branch, or the rafters of a house. Here two or three blind, naked babies are born. When old enough to leave the nest they scurry away.

The squirrel has many enemies. It is protected from its enemies by the dark colour of its coat

which makes it difficult to spy among the branches, while the golden stripes on its back look like sunshine gleaming through the leaves. Its long, sharp claws help it to scramble quickly up to the top of a tree. Its enemy, the cat, can climb trees too, but is no match for the light, nimble squirrel.

### *Things to make and do*

*In the school compound:*

Squirrels seem to have a language all their own. Look

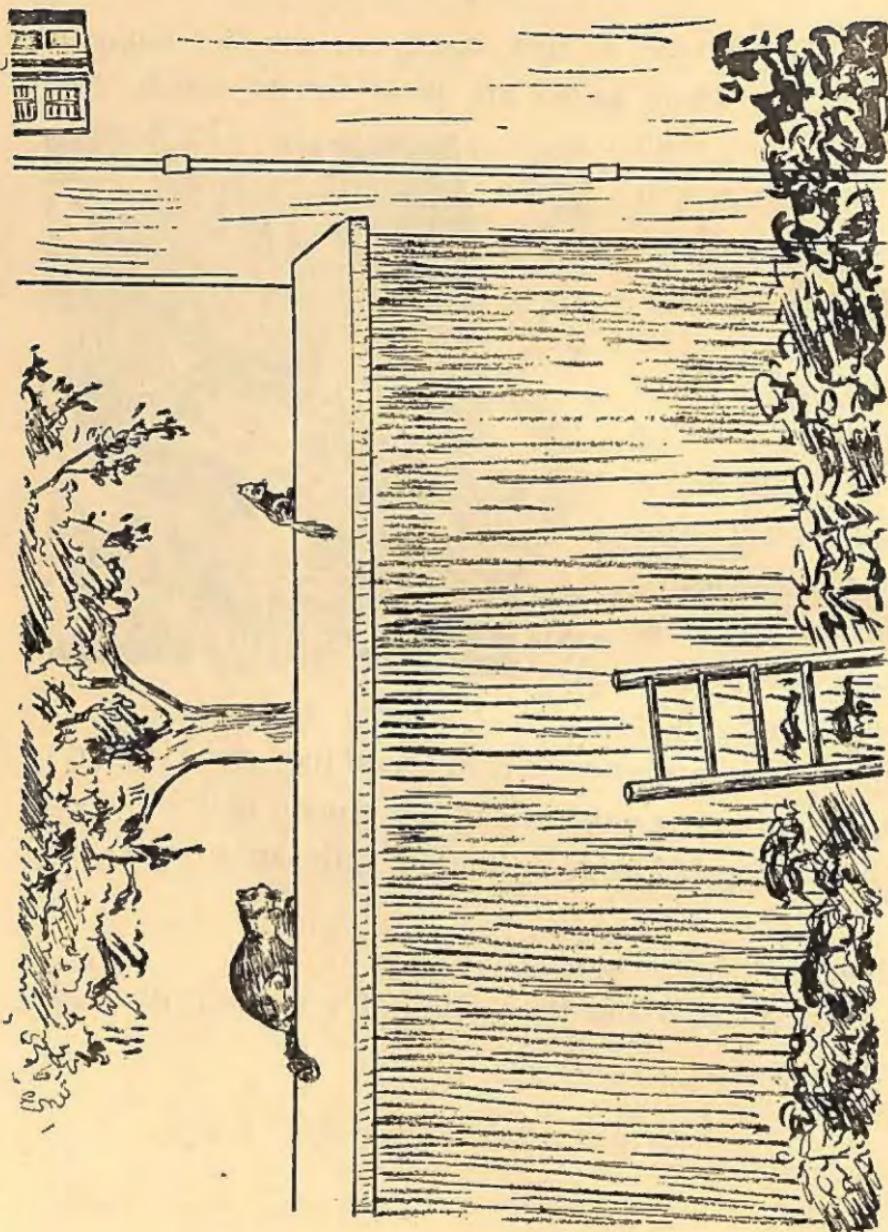
at two squirrels as they chase one another along the branches. Their games are good fun to watch. Every now and then one of them will stop and call out to its friend. Surely each call means something? Their shrill calls might mean that danger threatens, or be an invitation to a friend. You will see their

*Squirrels at play*

bulky tails jerking with each sound they make. Listen to them as they scamper along the ground or frisk among the tree-tops. How many kinds of calls can you make out?

*For your wall newspaper:*

Draw and colour the picture of a squirrel, illustrated on page 89.



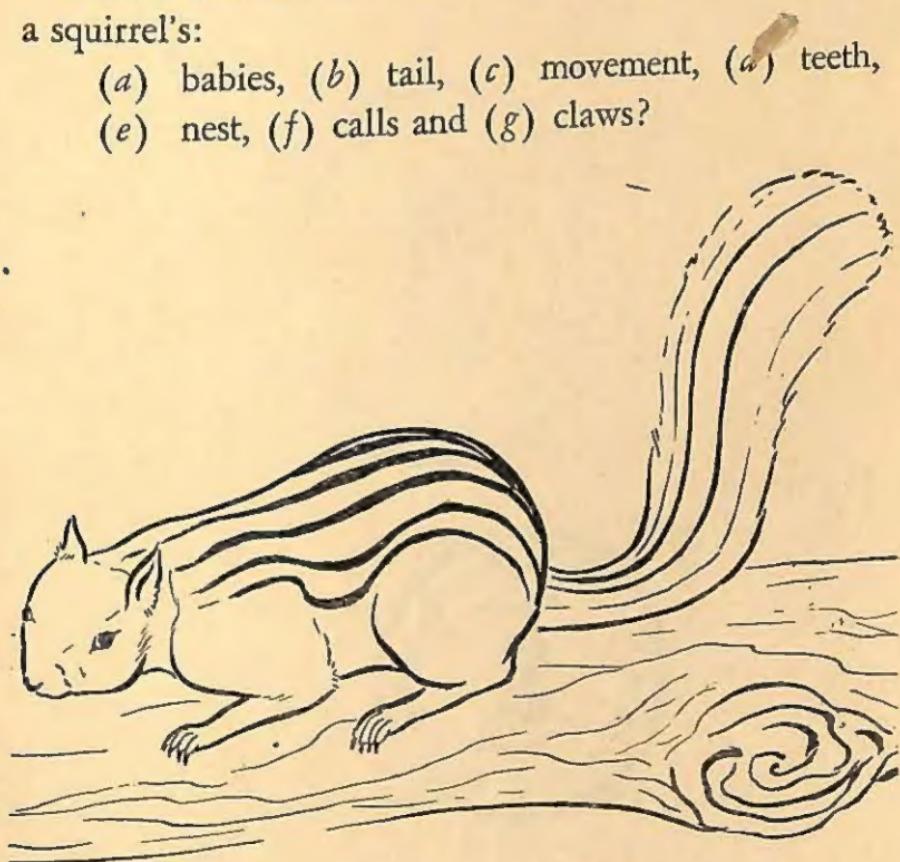
*Picture Story:*

The squirrel in the picture on the opposite page seems to be in danger. Make up a story about what you think will happen next, giving your story a happy ending. Think of a title for the picture.

*In your note-book:*

What words have been used in this chapter to describe a squirrel's:

(a) babies, (b) tail, (c) movement, (d) teeth,  
(e) nest, (f) calls and (g) claws?



*Draw and paint this picture.*

6855



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